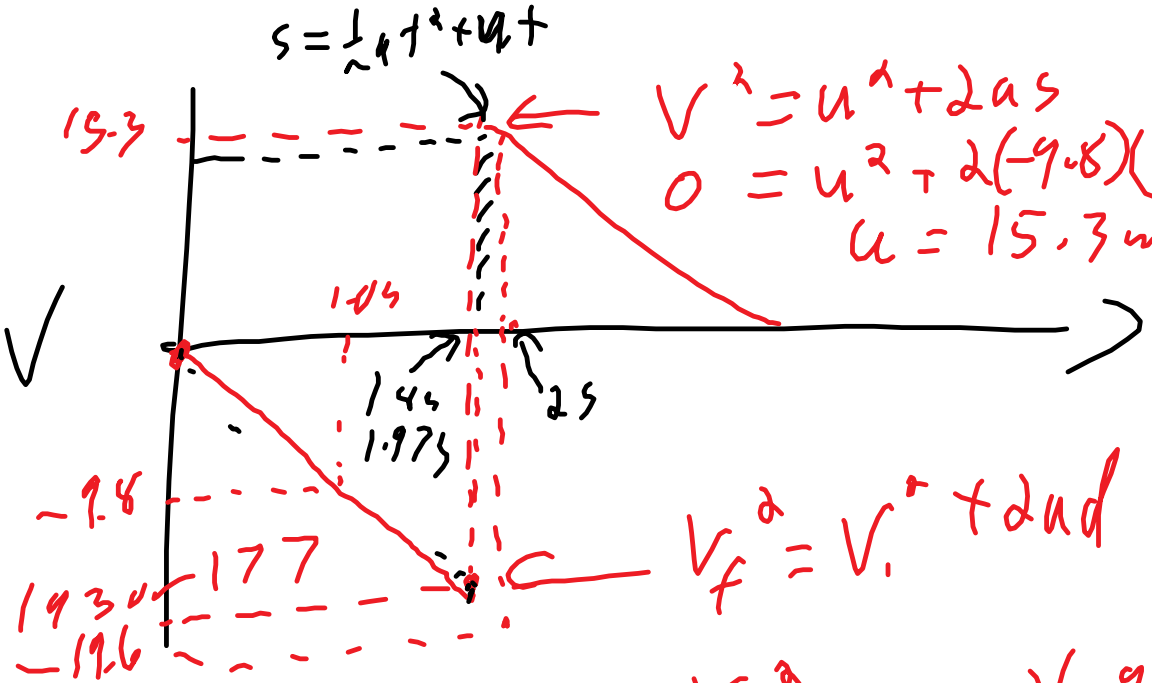
Test Short Answer Problems:



a) $t = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2(16 \text{ or } 19)}{9.8}}$

$t \approx 1.807 s$ or $1.969 s$

$t_{up} = 2s - 1.807 =$

$s = \frac{1}{2}(-9.8)(t_{up})^2 + u t_u$

$s = \cancel{0.2m \text{ or } 0.3m}$, $0.47m$

$0.193 s$

$0.47m$

$s = \frac{1}{2}(-9.8)(0.193s)^2 + 15.3(0.193s)$ 2.8 m or 0.47m

$s = \frac{1}{2}(-9.8)(0.031)^2 + 15.3(0.031s) = 0.47m$

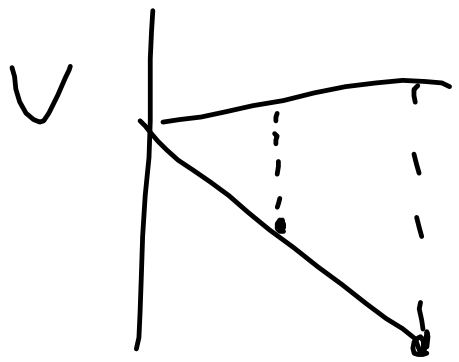
c) $t = \sqrt{\frac{2s}{d}} = 1.81s$ or $1.96s$

d) $v_{avg} = \frac{d}{t} = \frac{16m}{1.61s}$ or $\frac{19m}{1.96s}$

e) $v = at + u$

$v = -9.81(2.00s - 1.81$ or $1.97) + 15.3m/s$

after hitting ground

f) 

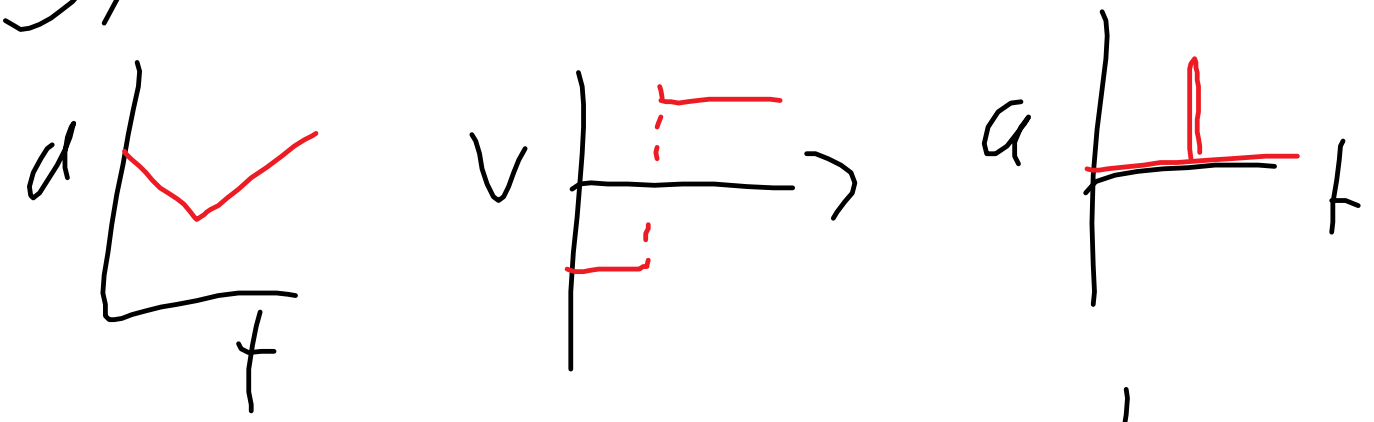
$v^2 = u^2 + 2as$

$s = \frac{v^2}{2(9.8)}$

$s = \frac{1}{2}at^2$ $s = 4.0m$ or $4.75m$

g) $15.3m/s$

9) 15.1 m/s



Bonus

$s_{ball} = s_{child}$

$\frac{1}{2}at^2 + 0t = v(t+2)$

$\frac{1}{2}(1.0\,m/s^2)t^2 + 0 = 6.4\,m/s(t-2)$

$t^2 - 12.8t + 25.6 = 0$

$$t = \frac{12.8 \pm \sqrt{12.8^2 - 4(25.6)}}{2}$$

$$t = \frac{12.8 \pm \sqrt{61.44}}{2} = \frac{12.8 \pm 7.84}{2}$$

$t = 2.46\,s$ or $10.3\,s$

$s \doteq 6.4(2.46 - 2)$

$\doteq 3.1\,m$

or $53\,m$

$s = \frac{1}{2}(1)(2.46)^2$

$s = 3.1\,m$

Elevators

2 student volunteers - one to stand on the scale, the other to push up/down on the student.

scale - read your weight but if Calvin pushes down, it reads a larger value.

So the scale doesn't always give your weight (force of gravity pulling you)

The scale gives a measure of the Normal (or Restoring) Force.

If there is no other forces up/down and no up/down acceleration, the normal force equals your weight.

But, if you stood on an elevator what would the scale read if

- you are 100.0 kg, the scale reads in Newtons and

a) you are at rest
b) you accelerate up at 2.0 m/s^2 for 3.0 s
c) you move at a constant 6.0 m/s velocity up for 4.0s
d) the elevator slows to a stop over 2.0s.
e) the elevator accelerates down at 2.0 m/s^2 for 1.0s
f) then the cable breaks and the elevator free falls 20.0 m.
g) When the car hits the ground, you stop over 1.5m of bending your knees.
h) sketch a F_N t graph
i) Think about what is the net force at each point

2. a 200 g and 250 g mass connected over a pulley. Determine the acceleration and tension in the strings when you let them go.